

1                   **GUIDED WAVE ELECTROOPTIC AND ACOUSTOOPTIC**  
2                   **TUNABLE FILTER APPARATUS AND METHOD**  
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4                   **ABSTRACT OF THE DISCLOSURE**

5                   A two-port guided wave tunable filter in a birefringent electrooptic and/or acoustooptic  
6 substrate material includes two 3-port, symmetric Y-branch beam splitters connected by two  
7 waveguide sections in which phase-matched polarization coupling occurs, with an input port  
8 and an output port. The optical path difference between the beam splitters is half an optical  
9 wavelength, and the polarization coupling regions between the beam splitters are relatively  
10 displaced by an odd integral multiple of half the spatial period of the perturbation responsible  
11 for the coupling. In one embodiment, an electrooptic tunable filter, the polarization coupling  
12 in the waveguides is caused by a spatially periodic strain-inducing film and tuning results from  
13 an applied electric field. In another embodiment, an acoustooptic tunable filter, polarization  
14 coupling results from a surface acoustic wave and tuning is accomplished by changing the  
15 acoustic frequency. Alternatively, four port electrooptic and acoustooptic tunable filters are  
16 formed by replacing the 3-port beam splitters with 4-port directional couplers, where in each of  
17 the directional couplers the splitting ratio for TE input polarization plus the splitting ratio for  
18 TM input polarization is substantially equal to one.  
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